35 cents per copy

ROCKS and MINERALS

Vol. 7. No. 4. DECEMBER, 1932 Whole No. 26

Courtesy of George O. Wild.

A Water-Driven Mill in the Nahe Valley at Idar, Germany.
Idar is the world's most famous center for the cutting and polishing of semi-precious stones.

Featured in This Issue:

A NON-TECHNICAL MAGAZINE
—ON—
MINING - PROSPECTING - GEOLOGY - MINERALOGY

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HOW THE CONTEST STANDS TO DATE

(As of October 20th)

ROCKS		MINERALS	
Granite	18,441	Gold	24,576
Marble	11,864	Quartz	9,165
Serpentine	5,673	Garnet	3,191
Coal	3,528	Hematite	1,874
Limestone	1,410	Mica	1,118
Sandstone	589	Pyrite	744
Conglomerate	567	Galena	610
Gneiss	535	Chalcopyrite	542
Schist	231	Calcite	541
Slate	231	Limonite	281
Shale	170	Sphalerite	140
Miscellaneous	104	Miscellaneous	561
Total votes cast	43,343	Total votes cast	43,343

YOUR LAST CHANCE

With the end of the present year, December 31, 1932, the great Rock and Mineral Voting Contest will close. To those who have not as yet voted, a few days of grace are still available. RUSH IN YOUR BALLOTS!

IMPORTANT NOTICE

The Special Opal Number which was to be featured this issue has been postponed to March. Due to many articles being contributed and which reached us at a late period it was necessary to make the postponement.

CHRISTMAS GREETINGS

Once again it is the happy duty of ROCKS AND MINERALS to extend to each and all of its readers, subscribers, advertisers, contributors and friends a very MERRY CHRISTMAS and a BRIGHT AND HAPPY NEW YEAR. May 1933 prosper you abundantly, socially and financially and may your warm interest in mineralogy be stimulated and increased.

WANTED: Correspondents in all parts of the world who will be kind enough to send us notes and news items on minerals, etc., that they think may be interesting to the subscribers of ROCKS AND MINERALS. Such as are available we shall be very glad to print in the magazine.

ROCKS and MINERALS

A NON-TECHNICAL MAGAZINE
—ON—
MINING—PROSPECTING—GEOLOGY—MINERALOGY

Published Quarterly | Founded 1926

Vol. 7 No. 4 | Whole Number 26

Contents for December, 1932

Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879

Specially written articles (as Contributions) are desired.

Subscription price $1.00 a year; foreign $1.25. Current numbers, 35c a copy; back number, 40c a copy. No responsibility is assumed for subscriptions paid to agents, and it is best to remit directly to the Publisher.

Issued on the 1st day of March, June, September and December. Forms close on the 20th of January, April, July and October.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

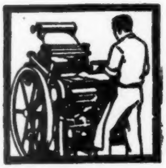
ROCKS AND MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

ROCKS and MINERALS

Edited and Published by Peter Zodac

PUBLISHED QUARTERLY



DECEMBER 1932

The Minerals of Silver City, New Mexico District

—*By*—

HERMAN WUESTNER,

Cincinnati, Ohio

Having in mind the well-known silver and vanadium minerals from Silver City, Georgetown, Lake Valley and Hillsboro, N. Mex., and thinking that some of these minerals may still be obtainable, I decided to visit the localities. On my arrival at Deming, N. Mex., in August 1929, I learned that all of the mines were closed, that the trains had stopped running on the Lake Valley branch, and in the absence of a place to stay overnight, I continued on to Santa Rita. I shall describe the minerals I found in a radius of about ten miles from Santa Rita. But it must be remembered that minerals change from place to place in a mine, and that the dumps from which I gathered most of my material bear only part of those found in the mine, and that I spent only an hour or two on some dumps covering acres of ground. Therefore, I do not claim this list to be complete. Besides those obtained from the dumps, some were given me by interested persons.

Santa Rita

The Chino Mines of Santa Rita are working one of the largest low-grade copper deposits in this country. Each day thousands of tons of ore yielding an average of 1.75% copper are dug up by a number of steam and electric shovels. The ore is exposed to a depth of about 200 feet in cuts a half-mile or more in length. I was told that enough ore is in sight for about twenty-five more years of surface mining with the same amount underground. In spending about five hours time in actual collecting at these mines, the following minerals were obtained:

Native Copper: Native copper is somewhat abundant, and is found in pieces up to one inch thick, and in films, in seams in the rock (an altered porphyry or quartzite), associated with cuprite, chalcocite or melaconite. An egg-shaped nodule of copper, about three inches thick by five inches long showed, when broken, an outer shell consisting of small octahedrons of copper, with a center of chalcocite having the unmistakable cleavage of galena, therefore corresponding to the mineral harrisite; the cleavage surfaces were covered with a thin film of native silver and copper.

Native Silver: Found in traces as above described.

Molybdenite: Obtainable in several places of the deposit on what seems to be an altered diorite; no large masses were observed.

Chalcocite: This mineral can be found in lumps of considerable size, and shows especially on a polished surface that it contains numerous rounded kernels of pyrite, while in the cavities perfect cubes of this mineral may be seen. It is also found filling seams in the porphyry. One slab, 4x6 inches, over one inch thick, of a columnar to fibrous structure and free of pyrite was found.

Chalcopyrite: Pyrite, bornite and covellite make up the minerals of the main ore body. They occur disseminated through a white quartzite or altered porphyry, or fill seams in these rocks so finely divided that they can barely be distinguished from each other.

Pyrite: Occurs everywhere in the mines, but no good crystals were observed.

Azurite: Abundant on the old "carbonate dumps"; beautiful small crystals may be found in cavities of the much decomposed porphyry, but no large showy specimens were seen.

Malachite: Found under similar circumstances as azurite.

Cuprite: Occurs with native copper, or chalcocite, mostly in fissures of decomposed porphyry. A beautiful specimen of chalcotrichite, occurring in bunches on calcite and also penetrating the same, coloring it a fine red; associated with native copper—was sent to me from the mines some time after my visit.

Martite: Found with native copper and sericite, in quartzite.

Melaconite: Is found with chalcocite native copper and cuprite.

Pearl Sinter: A specimen of this opaline silica was found on the day I left the mines; the pearly coatings enclosing chiefly grains of quartz show fine iridescent colors.

Siliceous Concretions: These occur some distance below the mines in a creek, in size up to three inches in diameter; they are of a bluish color, extremely hard, with a grain of clear quartz in the center.

Turquoise: A specimen of this mineral which had been found in the mine some years before my visit, and which was given to me at the office, had a beautiful blue color, but a consiaerable number of small grains of quartz were disseminated through the mass.

Brochantite: A fine specimen of this mineral was sent me from the mines after my visit. It was associated with malachite which had altered to a light blue, radiated mineral "shattuckite" (?).

Rocks: Nearly all the rocks in these mines are much altered, but this alteration gives some of them a pleasing appearance. A much altered porphyritic rock in the North Pit shows the pleasing crystals of feldspar altered to kaolin, the rock being stained with malachite, thus giving it a green color, in contrast to the white gaolin.

Broad vertical streaks of a greenish to bluish rock, and also a yellow, penetrating the rocks at the end of the North Pit, can be observed from a considerable distance; when examined closer, the one would resemble a massive yellow epidote, the other either caladonite or glauconite, according to the color; but when dried, they crack and fall to pieces, like clay. There is doubt as to their origin; they seem to belong to some volcanic blowout rather than being decomposed rock. Magnetite, pyrrhotite, chalcopyrite and pyrite are found in the fissures.

Mica: Some fine pseudo-hexagonal crystals of mica may be obtained from a dike-rock named grano-diorite by the U. S. Geological Survey. As much as can be learned from the decomposed rocks of the mines, the minerals of which they are composed are chiefly quartz, feldspar, sericite, epidote, and some mica.

Hanover District

These mines are located about two miles west of Santa Rita, and some of them have been worked for a long time. Consequently, the more interesting minerals of the oxidized zone are not obtainable at present. However, in spending about four hours on the dumps the following minerals were collected:

Galena: In small but well-developed cubes; massive.

Sphalerite: Small crystals and good cleavage masses.

Pyrite-Pyrrhotite-Chalcopyrite: Disseminated through the ore fairly good.

Cerussite-Angelsite-Calamine: Found in small amounts on older parts of the dump.

Malachite-Aurite: As coatings.

Nodules: Having a zonal structure of galena, anglesite, sphalerite and pyrite were of interest.

Garnet-Diopside-Hedenbergite: Form part of the vein matter.

Hedenbergite (Ferrous Anthopyllite): The identity of this mineral has not been positively established. It is of common occurrence in the Kelly, N. Mex., district, and here also it is common, although it seems to graduate from a coarse, broad plated, columnar, fan-shaped structure to a fine fibrous structure almost invisible to the naked eye. It is possible that there are two different minerals represented. The coarse columnar resembles a specimen from Australia labelled "Mangan-hedenbergite", which I procured lately while the freshest obtained in this district resembles a "ferrous anthophyllite". It is also found here radiating from kernels of chalcopyrite.

Fierro

Fierro is located a short distance north of Hanover. About three hours were spent at the Hanover Bessemer Iron and Copper Company property and the following minerals were obtained:

Chalmersite: I found this mineral as a thin seam in magnetite, but a massive specimen was given me at the office. The mineral, although rare, is of special interest. A polished specimen when put under the microscope showed the intergrowth of this mineral with chalcopyrite. and a black soft mineral intersecting this mass which resembled chalcocite, while patches of magnetite can be seen with the naked eye.

Chalcopyrite: Found in small veinlets cutting magnetite.

Magnetite: Is the chief mineral of this mine. It occurs in granular masses, sometimes intersected by veins of pyrite. chalcopyrite, and a grayish-blue fibrous mineral of the amphibole group; it also occurs sparingly in small masses of an unusual plated structure, a specimen of which, given me at the office, showed each thin plate terminating in a crystal form which seemed to indicate a simulated cleavage; in reality the magnetite appears to be pseudomorphic after coarsely crystalline calcite, as has been observed by earlier writers[1]. The bronze color of some of the magnetite is due to a thin film of hematite on the cleavage surfaces.

Martite: Is found frequently, giving the characteristic streak of this mineral but still magnetic.

Hematite var. Specularite: The lamellae of this mineral are so thin that when occurring with calcite they show a blood-red color against the white background.

Limonite: Found in small quantities but of no mineragolical importance.

Calcite: Associated with hematite, yellow garnet, epidote, and aphrosiderite; also a few flakes of chlorite; forms attractive specimens.

Aragonite: Both the "flos ferri" and fibrous varieties are abundant.

Azurite and **Malachite:** Found sparingly, usually as stains on other minerals.

Amphibole: A mineral of the amphibole group occurs in bluish-gray fibers forming seams in the ore; also as the mineral called "wood asbestos", usually resting upon serpentine.

Garnet: Masive, yellow to brown, also in trapezohedral crystals, abundant.

Hedenbergite: Both plated and fibrous; associated often with magnetite, abundant.

Serpentine: Abundant, of a green, yellow or white color, often penetrated by magnetite in such a manner that the seams and small particles of the magnetite appear to form a delicate veil on the yellow or green background. A crystalline limestone forms, with magnetite, similar specimens.

Holloysite: Abundant with serpentine.

Chrysocolla: Associated with serpentine, intersected by small seams of crysotile; occurs sparingly, but the white silky seams show off beautifully in the blue chrysocolla.

Vermiculite: A rock or ore, consisting of magnetite, calcite, a gray colored mica altered to steatite, contains small patches of a bronze colored mineral of a fine lamellar structure, very soft, leaving a heavy dull black mark on paper; may prove to belong to the vermiculite group.

[1]Lindgren, W.; Groton, L. C.; and Gordon, C. H., U. S. G. S. Prof. Paper 68 p. 313, 1910. The Ore Deposits of New Mexico.

Copper Flat

Copper Flat is located about two miles south of Hanover. About two hours were spent at this locality. The following minerals were collected:

Sphalerite: In very small but sharply outlined crystals of a steel-blue color were found in granular magnetite.

Pyrite: Sprinkled through the magnetite, but of no mineralogical importance.

Chalcopyrite: Disseminated through magnetite; one rare find was a sharply outlined crystal showing on each one of two faces three prefectly triangular etched figures.

Magnetite: In considerable quantities, usually granular, containing sphalerite, pyrite, pyrrhotite, chlorite, garnet and diopside, either disseminated through the ore or occupying cavities in same. Several specimens were found which show a radiating columnar structure, probably a pseudomorph of magnetite after marcasite. It also occurs as a pseudomorph after specular hematite.

Martite: Showing its characteristic streak, but still magnetic; occurs sparingly.

Chrysocolla: Abundant.

Kaolin: In masses impregnated with oxides of iron and carbonates of copper; has a mottled appearance.

Lucky Bill Mine

This mine is located several miles south of Santa Rita; about one hour was spent at the dump and several specimens were obtained, which had been brought up by miners. Lead, zinc, and vanadium seem to be the products of this mine. The ore is highly siliceous, of a chalcedonic nature, and chalcedony in fine, rope-like aggregates resembling strings of beads on a miniature scale often cover the massive mineral. Vanadinite and wulfenite, at least at present, can be obtained only in almost microscopic crystals occupying pores in the rock. Specimens showing a thick coating of earthy vanadinite, yellow, resembling carnotite in color, are abundant. Jasper of a deep yellow color, probably colored by vanadinite, was found. Some fine specimens of anglesite, galena, and sphalerite were also obtained.

Silver City

The Silver City Mines Company, about one and one-half miles east of the city, is about the only mine of interest to a mineral collector in this vicinity at present, and it is a producer of manganese-iron ore. The ore consists chiefly of pyrolusite with magnetite, hematite and goethite. These three minerals seem to be intimately mixed, but the pyrolusite is often found in very nice but small crystals. Manganite is rare and I found only three specimens of the plated variety. The ore, I am told, averages 13% manganese and 35% iron. A plumose variety of pyrolusite, associated with earthy hematite, also occurs. The hematite often forms a coating on calcite and then this is readily mistaken for siderite. No psilomelane was observed. Below this ore deposit, a bluish-white crystalline limestone, resembling a Tennessee marble, is found which is probably the source of the ore. A polished section under the microscope shows this rock to be impregnated with oxides of manganese and iron, and according to an analysis shown me yields a considerable amount of iron and manganese; pyrite and chalcopyrite are also present in this rock in small amounts.

Lone Mountain

At the Grant Group of Mines, six miles east of Silver City, I visited a fine ore body similar in mineral content to that of the Silver Spot Mine, exposed to view in an open cut about thirty feet deep and also at many prospect holes. Fine specimens of pyrolusite, consisting of groups of small but well-developed crystals, were obtained.

Central

An old abandoned mine, a short distance east of this town, showed a vein exposed to view which had been mined for gold, but which at present shows a breccia that seems to consist of an altered quartzite with psilomelane as a binding material. Wherever the psilomelane has not filled the openings in the vein completely it shows crystallization and is probably altered to pyrolusite or manganite. Psilomelane is a rare mineral in all manganese deposits of this district.

Pinos Altos

At this famous old pioneer mining camp, which I also visited, nothing of any importance can be obtained at present; only a few of the sulphides of iron, lead and zinc with stains of greenockite were found.

Ricolite: This rock or mineral has been mined to some extent at Red Rock about ten miles southwest of Silver City. I did not visit this locality, but the specimen given me consists of a dark-green mass of serpentine cut by light-green to almost white veins of the same mineral also containing thin seams of chrysotile The light-colored veins evidently have hardened first, the dark material seems to have exerted a pressure against them, fracturing same, producing numerous fractures along the outer part of the so formed arch. These fractures reach the inner line of the arch but do not cut the vein entirely, and are filled with the dark-green mineral. The whole mass forms a beautiful ornamental stone and I was told has been shipped as far as Chicago for interior decoration.

Lepidophaeite (?): A yellowish-brown mineral, fibrous, of a silky luster, the fibers being flexible, giving a black shining streak, and covering psilomelane was obtained at the mine near Central. Another was associated with pyrolusite at the Silver Spot Mine. The fibers are flexible. When a specimen is broken, the break resembles a piece of torn leather. I am not familiar with a mineral of exactly the same properties; it corresponds to the description of lepidophaeite, except the streak which should be reddish-brown; it may also be related to a varviscite. I only found it as a thin coating on the two specimens.

I am taking this opportunity of thanking Mr. Gerald J. Ballmer, Chief Geologist of the Chino Mines of Santa Rita, and his assistant, Mr. Emerick, who was with me for three days and served as a most courteous and helpful guide. Mr. L. M. Kniffen and Mr. Frank Harris, of Fierro; Mr. Ira Wright of Silver City; Mr. Ben J. Bosley and Mr. Thos. Donahue, also of Silver City; and Mr. R. O. Kirchman of the Silver Spot Mine. All of these gentlemen contributed very materially to the success of my trip.

Interesting Mineral Localities in Oregon

—*By*—

DR. H. C. DAKE,

Portland, Oregon

The best known mineral localities in Oregon, while not as numerous as those of some other states, produce many interesting minerals and are worthy of mention. All of the localities mentioned below can be easily reached by auto over excellent paved highways, and many of them are situated amidst scenic surroundings which alone makes a visit there worthwhile.

(1) WESTERN OREGON; Chalcedony (agate) is found at many places in western Oregon, at many points along the coast and with most of the stream gravels. Some very excellent agates are found in the Roque river gravels, in southwestern Oregon, much of this material being suitable for cutting and polishing.

In southwestern Oregon, and particularly in Curry county, much placer mining is done for gold and platinum. These placer operations also yield small amounts of iridosmine and laurite crystals, but the "silver pick" is needed to secure specimens. Most of the Curry county placers are "one man" plants, but they are very interesting to watch nevertheless.

Priceite, a borate mineral, is found in Curry county near Chetco, and specimens are available. Cinnabar can be collected at the Black Butte district near Ashland and at the workings near Cottage Grove. At the Waldo district, chromite, good rhodonite, rhodochrosite and some copper minerals can be found. The best rhodonite is found on Cave creek near

the well known Oregon caves (National Monument Park). The caves are spectacular and worthy of a visit, but removal of specimens from within the caves is forbidden.

In Josephine county, an unusual nickel iron mineral, josephinite is found plentiful along Steamboat and Josephine creeks. It occurs as metallic water worn pebbles, up to one inch in size. It has been thought by some that josephinite is of meteoric origin but this opinion is not supported by any scientific examination of the mineral.

Specimens of another uncommon nickel mineral, garnierite (noumeite) are found at Nickel mountain a short distance from the town of Riddle.

Beautiful and very rich specimens of native gold in quartz are often taken from the mines of southwestern Oregon and these can sometimes be had by purchase.

(2) CENTRAL OREGON; The best known mineral locality in central Oregon is near the town of Antelope, where many fine and very large quartz crystal lined geodes have been found. Chalcedony in large masses, jasper, amethyst and calcite are also found here. Much of the massive material is of good color and suitable cut and polished specimen material. The Antelope locality as well as the opal locality at Opal Springs were described in detail in previous issues of ROCKS AND MINERALS.*

At Klamath Falls, specimens of epidesmine and calcite are found. Cinnabar can be collected on the main highway near Dayville, where a road cut exposed a vein of cinnabar and calcite.

Many parts of central Oregon have been visited by very recent (geologically speaking) volcanic activity and are of interest in a geological way. Other than the peculiar volcanic "bombs", which are found lying on the surface, these recent lavas yield little in the way of specimens for the collector.

(3) EASTERN OREGON; Baker county has a number of well known copper and gold mines where numerous copper and gangue minerals can be collected. The Cornucopia district in the eastern part of the county has produced many fine specimens. At the Virtue mine, near the town of Baker, good pyrite crystals can be found on the old dumps.

In the Sumpter mining district, near the town of Sumpter, many of the mines are now inactive and only poor material is to be had on the old dumps. At the "ghost city" of Bourne, once an active mining center, some specimen material can be found. The town of Bourne, according to the 1930 census, shares honors with only one other town in the entire United States, in being the smallest. The official 1930 census credits Bourne with a population of exactly one. Collectors visiting Bourne will find no "parking problem" in this town.

To the west of the Sumpter district there are a number of good localities about the town of Prairie City. The Standard mine here produces some excellent cobaltite, smaltite, erythrite, pyrite and chalcopyrite specimens. At the numerous other mines in this region, specimens of galena, sphalerite, pyrite, chromite, serpentine and cinnabar, are available.

The best known zeolite locality in Oregon is at the Ritter Hot Springs, where a large supply of stilbite, calcite, mesolite, pseudomesolite, chabazite, thomsonite and other zeolites can be collected. Very little study or collecting has been done at this locality and it was said by members of a recent U. S. Geological Survey party visiting there, that a further detailed study of the minerals found here, would doubtless throw further light on the paragenesis of the zeolite group of minerals. Ritter springs is some fifty miles off the main highway from Pendleton, and can be reached over a fair mountain road. Good accommodations can be had at a small health resort located here.

While there are many other mineral localities in Oregon, the above list probably covers those of most interest to the collector.

Louis Reamer, of Orange, N. J., reports the following minerals as being found by him at the Forest of Dean Mine when the Rocks and Minerals Association held its first outing on June 26, 1932: brown zircon crystals in calcite, spinel crystals in crystalline limestone, and chalcopyrite. The list as given on page 84 of the last issue is not being reprinted in this issue.

*Quartz at Antelope, Oregon. By Dr. Henry C. Dake. Vol. 4, No. 4, Dec. 1929. A Unique Mineral Locality in Oregon. By Dr. Henry C. Dake, Vol. 3, No. 1, March 1928.

Trip to a Barite Locality in Missouri

—By—

DAISY PATRICIA BOYER,
Mount Olympus, Kimmswick, Missouri

The fifty mile drive from Kimmswick, Missouri, to the "tiff diggins" or "Old Mines" of southeastern Missouri, is one of much interest, both for its scenic beauty and mineral wealth. The rolling foothills merge into each other as you travel south, and by the time you have reached "Old Mines" the hills are Ozark Mountains, their tree bedecked summits smothered against the blue.

On the road to the barite or tiff country, the great Iron Mountain of the Ozarks is passed. Its steep sides are stained a reddish hue, revealing the fact that there is iron in the heart of the mountain.

My first trip to the large "tiff diggins" was taken one Sunday morning in early autumn when the Ozarks are a riot of color; the bright yellow leaves of the walnut trees blending with the oranges of the sassafras and the copper of the oak with the crimson leaves of the sumac. It was ten a. m. when we finally brought the car to a halt in "Old Mines" before an old log cabin where huge clusters of gaily colored "mineral blossoms" or quartz crystals adorned a bench in the weedy yard. We inquired of a bewhiskered hill-billy lounging near the broken gate how to get to the "tiff diggins". On being told that it was on yonder hill across the 'crick' we scrambled out of the car, glad to be able to stretch our tired limbs and be on our way.

The creek was forded and the hill tackled, the hill being nothing other than a great pile of tiff and mineral blossoms. When we finally scrambled out on top of the debris we were confronted with a wholly unexpected sight. Stretching out about one-half mile before us, and a vivid contrast to the blue sky above, was a lake of red mud, while standing half submerged in the mud was a large black tree, bare of all leaves, its ebony arms reaching imploringly toward the heavens seeming to ask that it be lifted from its doom.

After gazing our fill of the scene before us we continued on our way to the "diggins" we could see some quarter of a mile in the distance. Upon reaching the diggings we found two large steam shovels resting silently in a clearing, deep holes everywhere showing where they had previously sunk their massive jaws in the red residual clay. To one side was a great mass of clay and barites awaiting the turn in the washer. The washer was enclosed in a large frame building with a trough leading from the uppermost part of the building to the edge of the pretty red lake. After the tiff is mined it is dumped into the washer where it is washed clean of the red clay. The clay runs down the trough into the lake. The tiff is very heavy and oft times has bits of lead clinging to it. Chemically, barite is a barium sulphate, and is of many beautiful colors, ranging from white, through yellow, gray, blue, brown and red. The scientific name for this mineral is barite but the country folk of southeastern Missouri call it by the less scientific name, "tiff". Although this is the largest tiff diggings of southeastern Missouri there are many smaller diggings. Sometimes a land owner will have tiff on his land and a small stream. Then he mines the mineral and has his own washer on his land. In this way he prepares the tiff ready for sale and earns a comfortable living. Sometimes whole families will be seen out on the hills with picks and shovels digging for tiff, but this method of mining yields but a scanty living and the people who live thus often know the pangs of hunger and cold.

In the last few years the United States has produced nearly one half of the world's out-put of this mineral. Southeastern Missouri is one of the most important prducing areas. After the mineral is washed and ground it is ready for the manufacturing of barium chemicals. It is used to a great extent in the manufacturing of paint, rubber, and various other articles of commerce. Miscellaneous uses to which it is put includes sealing wax, printers ink, phonograph records, titanium pigments, and many other articles of use.

The Mono Craters

—*By*—

W. SCOTT LEWIS,
Hollywood, California

The Mono Craters consist of a somewhat crescent shaped range of twenty cones running south from Mono Lake in eastern California, not far from the Nevada line. The precipitous central cone reaches an elevation of nearly 3,000 feet above the lake, or about 9,000 feet above sea level. This is nearly twice the elevation of Mt. Vesuvius and the peak is much more precipitous.

The cones of the Mono Craters are composed of pumice, volcanic ash and flows of obsidian and were built up as the result of violent explosive eruptions. These were so powerful that pumice was scattered for many miles along the eastern side of the Sierra Nevada Mountains, while deposits of volcanic ash were formed over 100 miles away.

The length of time that has elapsed since the last eruption can not be determined with accuracy, but examination of a terminal moraine at the base of the nearby Sierras shows it covered with a plentiful sprinkling of pumice, proving that explosions have taken place since the retreat of the ice. The most recent eruption appears to have taken place in Panum Crater, the one nearest the lake. Here are vents that appear so recent one instinctively expects to smell sulphur fumes.

Two quite distinct periods of eruptions are shown by some of the craters. These are especially well marked in Panum. The first led to the formation of a large circular cup that has since experienced considerable erosion. The second, and probably the last in this part of the range, filled the center of the original crater with a jumbled mass of pumice and obsidian. The latter takes a number of interesting forms, sometimes showing flow structure and at other times consisting of peculiar mixtures of black glass and rock froth.

Farther south along the range there are obsidian flows of some size, although

The Mono Craters from Pumice Valley

pumice is the predominating surface feature. The interior of the cones is doubtless composed of much more solid material.

The Mono Craters not only offer an extremely interesting and instructive lesson in geological processes but give the collector an exceptional opportunity for securing a wide range of volcanic materials. The vents are doubtless situated along a fault line and the conditions attending their eruptions, and perhaps the chemical composition of the magma itself, naturally varied from point to point.

The region about the southern end of the range abounds in hot springs and here one finds various forms of opal deposited from hot solutions, as well as minerals of the kaolin group formed by the action of steam and hot water on feldspar. The hot spring deposits range from veins of hard milk opal to soft, porous geyserite, brightly stained with hematite. Near "The Geysers" a large underground stream of hot water boils up in the bottom of a pool in Owens River. The face of a cliff down stream about a quarter of a mile has a yellowish-green appearance when seen from a distance. Upon close examination this proves to be a coating of the extremely porous variety of opal known as "floatstone." It is pumice-like in structure and when a large piece is thrown in the river it floats away like wood. Small pieces usually sink as the proportion of open, surface pores is relatively greater in a small piece.

Near Casa Diablo Hot Springs an interesting form of geyserite has been found with rounded grains of obsidian scattered through it. They were evidently washed in while the deposit was forming. Some miles north of this point there is an extensive flow of porphyritic obsidian with very distinct phenocrysts. It ends in an abrupt wall of huge blocks and is a conspicuous feature of the landscape.

From Casa Diablo to Mono Lake the entire country, even far up on the Sierras, is literally buried under pumice. Looking at the soil one would think it altogether too barren to support vegetation, but in places there is a dense forest of Jeffrey pines. Even on the steep sides of the craters there is a scattering growth of pines, evidence that many years have elapsed since the last great eruption.

It is at the very northern end of the range that the collector finds his choicest specimens. Here is the best obsidian, much of it showing a fine conchoidal fracture when broken. Rarely one may find black obsidian mottled with reddish brown. This is very handsome when polished. Rarest of all are opalescent specimens showing beautiful rainbow colors.

In places the volcanic glass is banded as the result of motion while cooling. Again it is so expanded with gas as to be pumice-like. Some of the most beautiful specimens are composed of what might well be termed "rock froth" with veins of glistening glass running through it. In Panum Crater much of the material consists of huge blocks of obsidian greatly expanded with gas so they are nearly as light as pumice.

Without question the most interesting specimens found at the northern end of the range are the volcanic bombs. These

Interior of Panum Crater

Crater Wall of Obsidian and Pumice

consist of masses of lava violently ejected from the crater while in a molten condition. As they were thrown through the air the gas contained in them expanded producing a porous structure. At the same time the surface rapidly cooled and contracted, becoming glazed and often deeply fissured. These bombs have been found in all sizes from tiny ones not over an inch in diameter up to large ones several feet through. They vary greatly in shape according to their size and, doubtless, the temperature of the original mass and the distance to which they were thrown. The smaller ones are round or oval while the large ones are often of irregular shape. Some are distinctly flattened, although there are never any sharp corners.

The visitor to the Mono basin is sure to wonder if all volcanic activity is at an end. There is no way of determining this point. The fumaroles and miniature geysers at the southern end of the range show the internal heat has not entirely cooled. The geological record proves that periods of eruption have extended over a great length of time and have been separated by intervals of inactivity that may well have resembled the present. On the other hand there is evidence that volcanic activity is on the decline everywhere in the west. Truly a volcano is a poor subject for one who wishes to retain his reputation as a prophet!

The Petrified Forest National Monument

By

FRED W. SCHMELTZ

Of all the National Parks and Monuments, one of the most interesting to the mineral collector is the Petrified Forest in Arizona. This is one of our largest National Monuments, and has the distinction of containing not only the largest amount of petrified wood ever discovered, but by far the most beautiful.

The complete deposit is estimated to cover an area of over 100 square miles, and consists of several distinct forests. The National Monument comprises three forests which lie about 15 miles southeast of the city of Holbrook. After much public demand for the preservation of this natural wonder, the government set aside an area of 90 square miles in the year 1906; but reduced it to its present size of 40 square miles in 1911. A few miles to the east of the monument is the Blue Forest; and some 15 miles to the north is the Black Forest, lying in the colorful Painted Desert.

All of the forests are in a region of typical desert country, lying at an altitude of over 5000 feet. The climate is dry and hot, and the land is devoid of all life except for a few scattered sagebrush. How in contrast to anything like a living forest!

The petrified logs are strewn about in great profusion, some over 100 feet long and over 4 feet in diameter. However, most of them are broken up in sections of a few feet in length. It is interesting to note that no leaves and but few branches have ever been found. For this reason, and because the trunks all lie prostrate, most geologists conclude that the trees grew somewhere else, and floated to their present location. During the millions of years that followed, they were subject to the action of waters carrying silica, accompanied by the pressure of thousands of feet of rock which were being laid down at the same time; a subse-

quent erosion of this same rock once more bringing the trees into view.

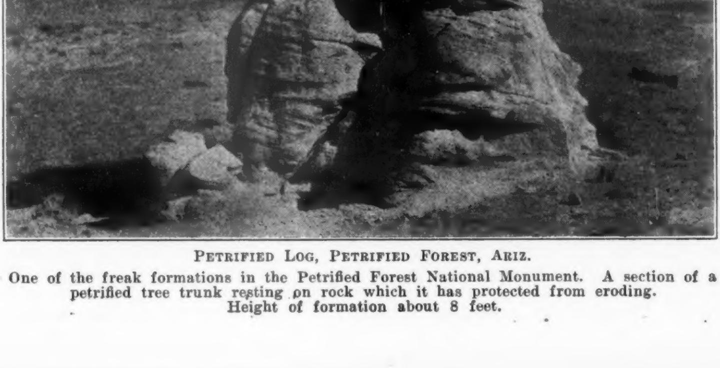
In the transformation from wood to chalcedony, traces of metallic compounds must have been present to form the remarkable colors which makes this Arizona material so distinctive. A slow process, this petrifaction must have been, for every detail of the wood structure has been preserved, from the rough surface of the bark down to the individual cells. The latter are easily distinguished with a microscope. Many cavities are present in the broken sections of logs, and these are often lined with brilliant crystals of quartz, ranging from the clear variety to a deep purple amethyst.

The rock formation in the monument consists of Triassic sandstone, shale, a loose conglomerate, and some clay intermixed. The sandstone being more resistant to erosion than the other rocks, forms the capping of low-lying mesas and buttes. This, with the various colors which are largely due to the blue and purple of the clay, makes some very pretty scenery.

The government maintains a small museum within the monument, where visitors may see some of the more unusual specimens and a great variety of polished pieces of petrified wood. It is in polishing that the beauty of its coloring is brought out to its fullest. Because of its hardness it takes a brilliant finish, and is used a good deal for jewelry and small ornaments. Few semi-precious stones compare with it for attractiveness.

The monument is best reached by auto from Holbrook. While it is unlawful to collect specimens within the boundaries of the monument (as one will soon learn from the numerous signs), the collector should not be dismayed, for there is plenty of wood just outside, and at the other forests. A very convenient place to gather specimens is just before crossing the boundary line (a barbed wire fence) on the highway from Holbrook. A few hundred feet away, on either side of the road, there is plenty of wood, from small chips to full-sized trunks. At the Blue Forest one will also find plenty of excellent specimens, though this is somewhat difficult to reach. The Black Forest, also known by the names "North" and "Sigillaria," is a good collecting ground; but here the wood is completely black, lacking any of the colors so characteristic of that from the other forests. However, it is well worth a visit, for here the "timber" is of gigantic size, some of the logs measuring 6 feet in thickness.

The petrified forest region is one mineral locality from which the collector is sure to return "loaded down."



Petrified Log, Petrified Forest, Ariz.

One of the freak formations in the Petrified Forest National Monument. A section of a petrified tree trunk resting on rock which it has protected from eroding. Height of formation about 8 feet.

Ulysses Sherman Grant
(1867-1932)

ULYSSES SHERMAN GRANT

Professor U. S. Grant, internationally known geologist and recognized educator in this country, died in Evanston, Illinois, September 21, 1932, after an operation from which he failed to recover. His service to Northwestern University for 33 years has endowed that Institution with a strong feeling of friendship for him and he will be greatly missed in the Department of Geology and Geography of which he was the head for so many years.

Dr. Grant was especially well liked, partly due to his jovial nature and good sense of humor which made it possible for him to blend serious matters with a pleasantness that characterized all his activity. He was also well liked because of the fairness with which he dealt with everyone. He never singled out one individual against another, but always gave a person whatever "break" he possibly could. This personality, which characterized Dr. Grant, was accompanied by a mastery of the science which he professed and his students and associates always respected his judgment and opinions.

Dr. Grant was born in Moline, Illinois, February 14, 1867. He attended the University of Minnesota, graduating in 1888. He was then attracted to Johns Hopkins University to pursue graduate studies and received the degree of Doctor of Philosophy in 1893. At Johns Hopkins he was one of the few men to study the methods of petrographic research, which were then being introduced from Heidelberg University, and in which he was recognized as a leader in later years.

He went back to Minnesota and served as Assistant State Geologist for seven years, part of which time he also instructed in geology at the University. He was also associate editor of **American Geologist**, one of the pioneer geological publications. He accepted a call to go to Northwestern University in 1899 and remained there until his death. He was acting dean of the College of Liberal Arts on two occasions.

During his association with Northwestern he was active in the field as well as in the class room. In his early years he investigated certain areas in northwestern Wisconsin which were reported to contain valuable copper deposits. In speaking of the contributions to science made by Dr. Grant, Dr. H. Foster Bain pointed out that in this early work, he was exacting in discriminating between the facts of his detailed observations and the personal interpretation he placed on them. This characterized his work throughout his life. This investigation was carried out

for the Wisconsin Geological and Natural History Survey of which he was geologist from 1899-1907.

For many years Dr. Grant was geologist of the United States Geological Survey in which capacity he investigated copper and other mineral resources of Prince William Sound and the Kenai Peninsula. He also studied and reported on glaciation in this region. He spent two years in the service of the Oregon Bureau of Mines and had served as consulting engineer of the Illinois Geological Survey since it was founded.

For many years he conducted a special field trip for advanced students in the Lake Superior region. These trips were taken by canoe and were noted for the excellent opportunity they afforded to learn and practice field methods. Pre-cambrian geology in its most complicated form was studied in detailed and exacting manner, but those who went on these trips always had an opportunity to study other phases of natural history as well as geology. Dr. Grant was a father, instructor, and friend to many.

FREDERICK SHEPHERD,
Museum of Science and Industry,
Chicago, Illinois.
September 27, 1932.

CORRECTIONS

In the last issue of ROCKS AND MINERALS (Sept. 1932), the third figure on page 89 of Dr. Spencer's article "Paper for Museum Labels" showed the wrong outline. The outline should have been an oval one. "The small label is for attaching to specimens and square corners are apt to get rubbed up on a rough rock surface," advises Dr. Spencer. "The largest label shown is the 'permanent label', while the other is for microscopic slides."

On page 84 of the same issue in the list of minerals found at the Forest of Dean Mine the 17th line up from the bottom of the list reads as follows:

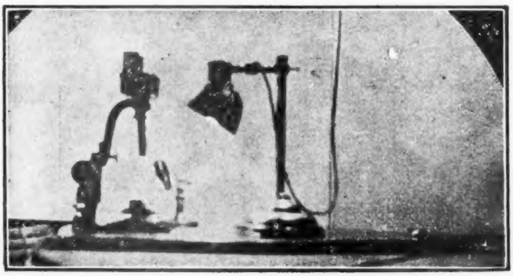
Magnetite iridescent xline . . .

Please change this to read—

Magnetite tarnished xline . . .

Magnetite does not occur iridescent.

A MICROSCOPICAL EXHIBIT BOARD



Another new appliance put on the market recently by John A. Grenzig, the popular mineral dealer of Brooklyn, is a microscopical exhibit board. The purpose of the board is to make more convenient the examination of minute specimens under a microscope. The board is about 2½ feet long and 10 inches wide at one end, tapering down to 5 inches at the other end. The small end is joined to a rubber-cushioned block by a pin while its large end rests on three rubber-tired wheels. The large end carries the microscope and other accessories. Assuming a number of people seated around a five-foot table the board, with its cushioned block set in the center of the table, can be completely revolved, giving every person an opportunity of examining exhibits without moving from their seats.

Price of boards $10.00 each, F. O. B. Brooklyn. Mfg. by John A. Grenzig & Son, Electric Contractors, 299 Adams Street, Brooklyn, N. Y.

The Devil's Postpile

— *By* —

ERNEST W. CHAPMAN,
1814 *Pepper Street, Alhambra, California*

The Devil is indeed well represented on the earth if one is to judge by the naming of various features of the earth's surface. In California alone are located the Devil's Postpile, Devil's Slide, Devil's Playground, Devil's Golf Course, Devil's Wash Basin, Devil's Punch Bowl, and several others.

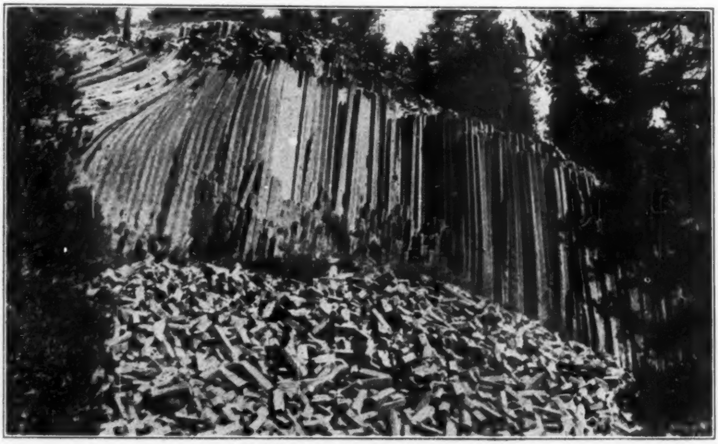
Among these possessions of the Devil in this corner of the earth perhaps the most interesting and spectacular is the Devil's Postpile. This is a huge mass of columnar basalt, located in the East Fork of the San Joaquin River in the Sierra Nevada Mountains.

It is accessible only from the east side of the range, except by pack train. One leaves the main highway at Casa Diablo Hot Springs (Spanish, meaning "Devil's house"), which is about forty miles north of the town of Bishop in the Owens Valley. Last year a road was completed into the San Joaquin River basin, so that it is now possible to drive to within ten minutes walk of the Postpile.

This huge mass of basalt, in cooling, assumed the pentagonal, or five-sided, columnar structure. Along the face of the cliff the columns, or "posts", are well defined and many have broken away and fallen to lay as huge blocks of talus at the base of the pile. From the top of this talus slope the column extend upward eighty feet or more.

A most interesting feature is found at the top of the postpile, where the level surface, scoured and striated by glaciers, is as an ancient mosaic floor laid in irregular pentagonal blocks.

The writer believes that anyone traveling through this vicinity will be well repaid by a visit to this very interesting and unusual formation.



The Devil's Postpile, California

Top of Devil's Postpile, California

The Gemological Institute

The Gemological Institute of Los Angeles has been organized to distribute information about gems. It does this work by means of correspondence courses. These courses are designed primarily for the instruction of jewelers and gem salesmen and their subject matter is based on the theory that men handling gems should know as much as possible about the goods they buy and sell.

It so happens that this is exactly the information that we as amateur lapidaries need and must have if we are to get the most out of our hobby. The things that we want to know are almost countless. There have been quite a few texts written on the subject of gem stones. Most of them are readable and instructive. But it has remained for the Gemological Institute to correlate the essentials of these texts into logical form, well indexed, and with such added information as they think pertinent, and to offer it in the form of correspondence courses.

They have three of these courses varying in scope. The elementary one is designed to give a good general knowledge of gems and is the one that most amateurs will probably be interested in. However, if a student wishes to go further in the study the second course is a continuation of the first one and the advanced course is a continuation of the intermediate one. There is no overlapping between them.

Students taking the intermediate or advanced course are furnished with specimens of material illustrating the various phenomena explained in the text. The Institute also lends to such students the commonly used aids to determination of gems such as hardness points, dichroscope, etc.

At the completion of the course the student is furnished a loose leaf reference volume of salient facts covered in the course of study.

At the time this is written the Institute has, in addition to the regular courses of study, some of the reference volumes which they are offering for a limited time only at a very nominal price. They are also offering a special introductory price on the elementary course of study but there is no certainty that these offers will be in effect at the time this appears.

We believe that either the study of the elementary course or the purchase of the reference work is well worth while for every amateur who wishes to get the most out of his hobby and to add interest to his work. J. H. HOWARD.

The Triassic Rocks of New Jersey

—*By*—

MARY CANTY

Considering the rate at which rocks are being formed today and the approximate rate at which they were formed in the past, it is probable that the Triassic age was about thirteen million years ago. This date is given to bring to our way of understanding time the very great age of more or less recent rock formations. This time may be millions of years from being correct. The estimate is taken from material given at the University of Chicago by Professor Rollin T. Chamberlin. He gave the duration of the Mesozoic era, of which the Triassic is the first period, as probably about nine million years; the Eocene, Miocene, and Pliocene periods of the Cenozoic era, from three to four million years; and the glacial and human periods, is probably less than one million years.

In the age previous to the Triassic period, there had been a great Appalachian uplift and during the entire Triassic age there was a continual wearing away of this uplifted area and later a depositing of these sediments, which formed what is now known as the Newark group. During this time there were wide flood plains of rivers and long narrow estuaries mainly of fresh or brackish water. There was a large amount of sand and clay of reddish-brown color laid down at this time, perhaps fifteen thousand feet or more. During the later part of this period there were three, or perhaps four volcanic disturbances, both intrusive (below the surface) and extrusive (which flowed out onto the surface). Some time after this, the sandstones and shales were dislocated by movements of the earth's crust and normal faults were developed with a general northeast, southwest trend. This probably formed high hills which were worn down later to hills of moderate altitude. The volcanic rock, being harder, maintained its altitude, while the others were reduced to a very low relief in the following epochs. Then, quite recently, geologically speaking, the great ice sheet came over this region, doing its work of eroding and depositing.

The evidence of all this we can see on a short walk from where we live in Upper Montclair, New Jersey. Our town is built on the eastern side of one of the three hills formed by the lava flows of the Triassic period. Our streets are laid in a general northeast, southwest direction, following the general trend of the rock formation. Here and there we find glacial boulders, mostly gneiss and granite, brought from the highland region of New Jersey. In broken and worn black shale, probably from the Kittatiny Valley, where the hills or ridges separating the sub-valleys are mostly of the same colored shale, we find sea-life fossils. I have on my desk good examples of pelecypods from an eighth of an inch to a half an inch in width, and a brachiopod, of an inch and a quarter. These also have been brought down here by the glacier.

An abandoned quarry in the volcanic rock offers us an unusually interesting place for study. A deep cut has been made below the volcanic rock into the underlying reddish-brown sandstone and shale. On one layer of this sandstone we find ripple marks, raindrop impressions and mud cracks, showing that the water was very shallow over it or it did not cover it at all. I have a well-preserved dinosaur footprint found there. It has three toes, the longest one of which is seven inches long, and the two smaller ones, three and one-half inches long. It is four inches wide at its widest part. I have, also, some other small animal's footprints, about an inch wide and a half an inch long. Two of these are clear impressions, and there are other indistinct and smaller prints nearby which may mean that the animal had two smaller front feet as some did at that time.

The volcanic rock above this sedimentary rock and lying comfortably upon it is commonly called "trap rock". It is basalt. It was poured out upon the surface, cooled, buried under subsequent deposits, uplifted, left exposed again by erosion, and glaciated. The air cavities

of this rock contains several kinds of minerals. We have found quartz in transparent crystals, and in the forms of amethyst, agate, smoky quartz and milky quartz. There is also opal, much calcite, and many, though small, crystals of stilbite in sheaf-like crystals, colorless to white, yellow, or brown in color.

As the quarry is no longer worked, large or unusually interesting specimens are no longer to be found. But there is compensation in the fact that happy rock hunters may stay there all day long, hammering away to their heart's content with the hope of bringing to light some interesting specimen.

Ideas and Suggestions

SENT IN BY READERS

A matter of vital importance in the spread of mineralogy is how to interest youngsters in the subject. It is the youngsters we must approach and interest as they are the future mineralogists of tomorrow.

A number of suggestions have been received; some of our dealers even offering to donate a goodly amount of mineral specimens for this purpose.

To our mind the plan which has merit and most easily carried out is to open a department in the magazine of special interest to nature teachers who in turn will impart the information thus derived to their charges.

One of the chief drawbacks to the successful introduction of mineralogy in public schools is the lack of good elementary literature on the subject. We have had occasion to examine text books used by nature teachers in which mineralogy was presented not only in an uninteresting manner, but with many discrepancies as well.

Therefore, literature that is accurate, up-to-date and presented in an interesting manner is of vital importance. And ROCKS AND MINERALS is the publication that should print this.

We would be very glad to open up this department if a competent person were to volunteer his or her services in the cause of mineralogy. We believe a nature teacher and particularly one successful in teaching mineralogy to be the ideal person to take charge of this assignment.

Fred W. Schmeltz, Director of Outings of the Rocks and Minerals Association, suggests changing the name of officers who will assist him with the 1933 outing from Assistant Director to Director of the (name of State or Section) Division, Rocks and Minerals Association National Outing. The suggestion has been approved.

The honor to be the first member to register as an Assistant Director (now changed to Director) of the 1933 National Outing falls to Mr. Wayne W. Ward, of 712 N. Tejon St., Colorado Springs, Colo. Mr. Ward is very enthusiastic over a National Outing and has assured Mr. Schmeltz of his wholehearted support. " . . . A National Outing, with proper organization and publicity, would awaken an interest . . . that could not be brought about in any other way. . . . I will do everything within my power to make the local Division of the National Outing a success. . . . I am secretary of a group of enthusiastic young people . . . 'The Alpine Club' . . . can promise the full hearted support of this organization . . . " writes Mr. Ward.

The second member to register is Mrs. Grace S. Beckwith, of 67 Dana St., Cambridge, Mass., who will head the Massachusetts Division. Mrs. Beckwith was present at the first outing, held last June at the Forest of Dean Mine, with which she was much pleased and has also assured Mr. Schmeltz of her loyal support.

Who will be the third member to register?

Field Museum Notes and News Items

Contributed by

THE FIELD MUSEUM OF NATURAL HISTORY

Chicago, Ill.

A piece of rock salt, four inches thick, with a desert plant growing directly through it, is an exhibit which attracts surprised attention among visitors to Frederick J. V. Skiff Hall at the Museum. The specimen was obtained by a Marshall Field expedition to South America. It is one of numerous small woods growing through holes in a layer of rock salt observed by Henry W. Nichols, associate curator of geology, and geologist of the expedition, while passing through a shallow depression in the floor of the Atacama Desert near Calama in northern Chile. The salt layer in the region ranges from four to twelve inches in thickness, and the plants grow through holes barely large enough to accommodate their stems. The living plants in the desert, Mr. Nichols says, seemed to be nearly as dry as the museum's specimen now is.

Specimens of rare fossil mammals, turtles, and crocodiles have been received at the museum as the result of a field trip into western Colorado recently conducted bv Bryan Patterson, assistant in paleontology at the museum. Mr. Patterson was accompanied on the fossil hunting trip by M. J. Newbill of LaGrange, Ill.

Asbestos cloth is another one of the many products usually considered as comparatively modern which a little research reveals as having an ancient history, according to an article by Henry W. Nichols, associate curator of geology at the museum. In an article in the September issue of **Field Museum News** the monthly bulletin published for members of the museum, Mr. Nichols writes:

"It has been known for hundreds of years that the longer and stronger fibers of the mineral asbestos could be spun into thread and woven into cloth. The ancient Romans used asbestos, believing it to be of vegetable origin, just as they believed silk was a wool which grew on trees.

"In the Middle Ages asbestos cloth napkins were used, eliminating laundering, as they were thrown into the fire for cleaning. About 1250 Marco Polo found in Tartary asbestos cloth purported to have been made from the skin of a salamander, thus associating the fabled ability of that animal to live in the midst of flames with the fire-resisting qualities of the asbestos cloth.

"It is an almost universal rule that minerals are brittle. They may be hard or tough, but few of them can be bent without breaking. When a mineral departs from this condition, and is both fireproof and flexible as well, as is asbestos, it can serve important purposes in industry. Asbestos is the fibrous form of either of two minerals, serpentine and amphibole."

The museum has on exhibition in Frederick J. V. Skiff Hall a collection of various forms of asbestos and products made from it.

If a whale had not swallowed Jonah, a prehistoric shark could have. Except for the fact that such sharks, which had jaws about five feet wide, lived a good many million years before Jonah's time.

Based on the evidence produced by the research of paleontologists, a model of a great pair of jaws of the extinct shark known as **Charcharadon** is on exhibition in Ernest R. Graham Hall at the museum. Actual teeth of this huge creature which inhabited the waters off the Carolina coast in Miocene time, some 19,000,000 to 23,000,000 years ago, have been

set in the model of the jaws. These teeth are three to five inches in breadth. To provide contrast there is exhibited with the model a pair of jaws of a modern shark with a spread only a fraction of the five-foot gape of the ancient creature.

"Fossil teeth of this great shark, flat and trinagular in shape, are found in the phosphate beds of Carolina and Florida and in "shell-rock" as far west as Texas," writes Elmer S. Riggs, associate curator of paleontology, in the September issue of **Field Museum News.** "Skeletons of these sharks, being of cartilage, were not preserved as fossils, but their teeth were bony and covered with a strong coat of enamel which resisted decay. Comparing the size of these teeth with those of modern sharks, it is estimated that the jaws must have been five feet in breadth, and the shark nearly forty feet long.

Fossil shark teeth were known and prized by the American Indians before the advent of the white man in America. Numbers of them have been found in Indian burial places from the Gulf states as far northward as the Indian mounds of Ohio. This is evidence that the teeth became objects of barter and as such were carried and distributed from tribe to tribe. They are of further interest to modern science in showing that those great sharks were once abundant in the warm waters of the South Atlantic and the Gulf of Mexico."

Restorations of the so-called four-legged fish of the order **Stegocephali** of which numerous specimens are reported to have been found in Greenland by Dr. Laugo Koch, are on exhibition at the museum.

The land-going phase of the animal is represented in one of the restorations which is included in the museum's life-size reconstruction of a living forest of giant trees of the Coal Age, as it appeared some 250,000,000 years ago. Fossils found at various places indicate that these so-called fish were the earliest four-footed inhabitants of such forests. The second specimen is shown separately in its place among the museum's chronologically arranged extensive collection of fossils and restorations of prehistoric creatures of all ages.

These restorations were made recently at the museum, under the supervision of Dr. B. E. Dahlgren, acting curator of botany, who was responsible for the creation of the carboniferous forest group. They were modeled on the basis of previously known fragments of fossils pieced together. It appears that Dr. Koch has discovered quantities of complete skeletons, where hitherto only fragments have been available anywhere in the world, Dr. Dahlgren states.

The museum's restorations represent the species designated by paleontologists as **Diplovertebron.** This was one of the fish-like ancestors of the four-footed vertebrates from which evolved both the reptiles and the amphibians, according to Dr. Dahlgren.

"The group of extinct amphibia to which **Diplovertebron** belongs is of importance not only as including the predecessors and ancestors of the very different present-day amphibia, but especially as forming the connecting link between the fishes of the preceding period and the reptiles of the next," states Dr. Dahlgren. "To the distinction of being the first back-boned animals to move on four legs, and thus of being the pioneers of vertebrate life on land, they add that of being the progenitors of the early reptiles and through them of the birds and mammals, the latter, of course, including the human race."

Thrilling motion pictures, largely taken from airplanes, recording the amazing archaeological and geological discoveries made by the recent Shippee-Johnson Expedition to the Peruvian Andes, were shown recently at the museum in conjunction with a lecture.

Robert Shippee, of Red Bank, N. J., who was leader of the expedition, was the lecturer. The expedition made the first aerial survey of the Peruvian Andes, discovered a mysterious "great wall of Peru" apparently built by pre-Inca people, and mapped the "valley of volcanoes." Landings were made at elevations as high as 12,500 feet, and some of the photography was carried on at altitudes up to 24,700 feet above sea level, where the explorers had to breathe from oxygen tanks. Much work was also done on the ground, weeks being spent on muleback over the same rough trails trod by Pizarro and his conquistadoros four centuries ago. Photographs were obtained of volcanic craters, glaciers and snowpeaks never before seen

by white men. Strange native peoples were encountered who have lived all their lives so remote from the modern world that they had never seen a piece of machinery, and thought the expedition in its airplanes was a visitation from the gods.

The only complete skeleton ever discovered of the prehistoric South American sloth known to scientists as **Pronothrotherium,** was placed on exhibition recently in Ernest R. Graham Hall at the museum. This rare fossil, the bones of which have been articulated at the museum as they would have functioned in the living animal, is shown in a group with a fossil Glyptodon or extinct armadillo-like animal. The scientific name of the latter is **Sclorocalyptus.** Both animals lived in Pliocene times, generally estimated to have been about seven million years ago. The specimens were both collected by the Second Marshall Field Paleontogical Expedition to Argentina and Bolivia, led by Associate Curator Elmer S. Riggs. The skeletons were mounted by P. C. Orr of the museum's paleontological staff.

Until Mr. Riggs unearthed this skeleton of **Pronothrotherium** in the state of Catamarea in northern Argentina, only specimens of the animal's skull had ever been found previously, and many facts about the rest of the body were a matter of conjecture. This sloth, related to the small modern tree sloths of South America, was about the size of a grizzly bear. Its head was very small in comparison with its body. It fed upon the leaves and fruits of trees, and the museum specimen has been mounted in a lifelike position, reared against a tree to obtain food from the branches. Other species of ground sloths, not so rare as this one, grew to much larger sizes, and specimens of some of these are also exhibited at the museum.

The Glyptodon was a shell-covered animal, about three feet long, in general appearance resembling a turtle, but its shell covered only its back, and its underside was unprotected. It was an ancestor of the small modern armadillos found in South America, and like them could draw its head and legs inside the natural citadel of its shell for protection against its flesh-eating enemies. It fed largely upon the roots of trees and other plants, and its feet were fitted with strong claws for digging them up.

The importance of Illinois as a producer of minerals of commercial value, commonly lost sight of because of its characterization as an agricultural state, is vividly brought out among the comprehensive exhibits at the museum of the mineral products of the whole world. These exhibits demonstrate that the mineral resources of this state are large, and that their mining is an industry greater than the similar industries of most states.

While the mineral products of Illinois are not the spectacular ones like the gold and silver of Colorado, or the diamonds of South Africa, they are the real money makers, like coal, silica, shale, clay, sand, gravel, petroleum, and on down through the list to the less known products such as feldspar, magnesia from dolomite, peat, and marl, it is pointed out by Henry W. Nichols, associate curator of geology at the museum.

Incidentally a certain amount of silver is mined in Illinois, in conjunction with lead from the fluorite deposits in the extreme south of the state, and possibly even diamonds and gold could be found in the state, Mr. Nichols says, though not on a scale worth exploiting.

"I have no doubt that a few diamonds exist in the terminal moraine of the glaciers which swept Illinois up to about twenty to fifty thousand years ago," Mr. Nichols states, "for a few diamonds have been found in the moraines of Wisconsin, Michigan and Indiana, and it is not likely that Illinois was entirely passed over during the distribution by the glaciers of these floats from undiscovered diamond fields of the far north. Likewise, small quantities of float gold have been washed from the moraine in Indiana, and probably a man armed with a pan and a most unusual amount of persistence could, if he kept at it long enough, wash a few flakes of gold from our gravels, but he certainly would not make a living at it. The maximum possible earnings of such a man working along the Indiana moraine might amount to about one dollar a day, and it is doubtful if more than one man in thousands would attain anything like that.

A new industry awaiting development in Illinois is marble quarrying. Deposits have been found which appear to have as desirable qualities as the better known deposits in other states. The largest mineral developments in the state are in coal, oil, limestone, cement, and high-grade clays. The most important fluorite mines of the country are here, and the highest quality of sands are quarried on a very large scale at Ottawa. These have been adopted as the nation's standard for testing and comparison purposes. Lead and zinc are the only metallic ores in the state the mining of which has reached important proportions."

Notes from the Harvard Mineralogical Museum

The Mineralogical Museum of Harvard University has recently acquired two important collections of minerals by purchase.

The Bello collection of minerals from Portugal and Portugese colonies was brought together by M. Bello of Lisbon. It comprises about 1700 specimens of all the species of minerals found in these countries, many of them from mines and quarries no longer active so that they are not likely to be again found.

The most remarkable specimens in M. Bello's collection are several hundred crystals of microcline feldspar. They range in size from a foot across to slender prisms and show every variety of twinning known in surprising variety. Smoky quartz crystals are associated with the microcline in a few specimens. They come from cavities in granite pegmatite from a number of localities. No mention of these unusual feldspar crystals can be found in any of the works on mineralogy accessible to the writer.

Quartz is represented by many crystals, colorless and smoky, with some of the less common forms.

The cassiterite series is noteworthy. Crystals and placer specimens in great variety from a number of mines in Portugal and from Mozambique constitute an unique series.

Autunite and torbernite, ores of uranium, form one of the showiest series of the collection as well as one of the rarest. The mines from which they were taken had but a short existence but seem to have been very rich while they were worked.

In connection with this collection M. Bello has compiled a valuable list of mineral occurrences in Portugal, more complete than any hitherto available. It is hoped that this list may be published.

The second collection consists of a series of ores from the mines of Bolivia, made by the German mining geologist, Dr. F. Ahlfeld. About 750 specimens include ores of bismuth, tin, tungsten, gold, silver, lead, copper and antimony. A majority of them are well crystallized and some are accompanied by quantitative analyses.

The two most complete series of beautifully crystallized specimens are those of cassiterite and wolframite. The former include superb pieces ranging in color from black through brown and amber to almost white with great variety of habit from simple crystals to complex twins. Massive and fibrous varieties are also present in bewildering variety and compel one to quite revise ones previous mental picture of this mineral species. The wolframite-ferberite series includes showy crystals with clear quartz and huge individuals several pounds in weight. Native bismuth and bismuthinite are represented by particularly handsome specimens. There are complete series of the sulfostannites peculiar to Bolivia, franckeite, teallite, cyclindrite and stannite, the latter often in crystals. One vein of pure teallite is more than six inches across and weighs many pounds. Stibnite and many species of sulfantimonides of lead and copper are well represented. Placer specimens of bismuth and cassiterite are numerous and some of them remarkable for the purity of the large pebbles. This collection is rich in possibilities for new descriptive material of many species of uncommon minerals.

A selection from these two collections has been put on exhibition in the acquisition case on the main floor of the Mineralogical Museum at Harvard.

The Gem Department

Conducted by GILBERT HART

TESTING AMBER

By

DR. H. C. DAKE
Portland, Oregon

Owing to the large number of manufactured materials appearing on the market as a substitute for amber, a few simple tests for the identification of same is desirable. Bakelite and similar artificial materials are the most common substitutes for the fossil resin amber. Bakelite and similar materials, however, are harder than amber and a rough test made for hardness will usually distinguish between the materials. Amber will also readily ignite in the open flame, while Bakelite can only be ignited with difficulty.

Due to a difference in the specific gravities of the two materials, the most reliable, quick, and easy test, is to use a saturated aqueous solution of common salt. Natural amber will float upon the surface of this solution, while Bakelite as well as practically all other substitutes will sink to the bottom. This easy test can be readily carried out on an entire strand of beads as well as any other large object, where the material is in doubt and with no injury to same.

ARTIFICIAL DIAMONDS

By

GEORGE O. WILD,
Idar, Germany

The experiments of Moissan attained world-wide recognition as he was said to have produced diamonds in small crystals. Chemical analysis and hardness tests seemed to verify the products made as true diamonds. There were, however, no experiments conducted regarding the refractive index of the supposed diamonds as no proper method was known at that time for examining such minute crystals. The X-ray method of analysis was also unknown which today allows us to obtain structural knowledge of substances.

M. K. Hoffman of Leipzig, Germany, has lately repeated the Ruff experiments with similar results. Ln order to find the refractive index, Hoffman used the method of the "Becke Line" which had been developed in the meantime and which is suited for very small and minute substances. The substance to be examined is imbedded in a liquid of high refractive power which can be varied and the "Becke Line" wanders into the medium of higher refraction upon lifting the eyepiece of the microscope. When using a liquid of 1.75 the line wandered into the liquid, showing that the index of the substance was below 1.75. The correct index was found to be 1.74 while that of diamond is 2.10. The method is very sensitive and very accurate.

X-ray analysis, also possible with minute quantities of material, brought negative results and showed that the crystals obtained had a different structure from that of diamond. The nature of the product has not as yet been identified.

In the future it will be necessary to test all artificial products of this nature with the above mentioned methods as all other proofs remain doubtful when minute quantities are examined.

THE SYNTHESIS OF THE DIAMOND

—*By*—

EUGENE W. BLANK,

Scientific Editor, ROCKS AND MINERALS

Due to its rarity and adaptibility to a variety of uses, including its universal favor as a gemstone, the diamond has been the subject of countless researches. Throughout the 19th century its synthesis was industriously sought to such a degree it likens the period to that during which the alchemists and philosophers hoped to discover the **philosophers stone** by weird compounding and mystical discussion.

Between coal and diamond there is apparently a great difference, yet both readily burn, since diamond like its counterpart coal, is pure carbon. Diamonds can be readily burnt by placing them on a strip of platinum foil heated to redness by the passage of an electric current. The ignition temperature ranges from 700° to 900° C. depending, among other things, principally upon the hardness of the stone under experiment. The ash or residue from the combustion consists of traces of iron, lime, magnesia, titanium and silica. The ash is usually quite small; on the order of 0.05% or so. Black diamonds, the so-called bort, have a greater amount of ash corresponding to their greater impurity.

In 1828, C. Cagniard de la Tour announced that he had succeeded in synthesizing the diamond but subsequent work by other investigators showed the error of his experiment. The early years of the 19th century reveal a great number of papers in the various scientific journals of the day, which, though for the most part outdated, are of intense interest to the student of chemical history and of absorbing interest to read.

The views of A. Konig (I) offer a means of correlating the immense number of experiments upon the diamond. According to his work graphite is the stable modification of carbon at temperatures greater than 1000° C., while the diamond is unstable at lower temperatures. It is not quite certain if there is a transition point for diamond or graphite there being some evidence for believing that the diamond is unstable at all temperatures. The durability of the diamond leads one to believe that if one form does pass into the other at ordinary temperatures the rate of transformation must be very slow.

Konig points out that although the specific volume of the diamond is smaller than that of graphite, so that the transition point can be raised by pressure, the formation of the diamond at low temperatures and high pressure is exceedingly unlikely. The most successful manner in which to produce the diamond is by using a high temperature and in some way producing and holding the labile form before the stable form. The best methods of diamond formation so far proposed induce the above desired condition by crystallization from a molten flux, by separation from solution or by direct condensation of vaporized carbon.

In illustration of the latter method of synthesis a carbon arc operating in liquid air gives a minute residue of transparent crystals which possess the properties of the diamond. A carbon arc through which a spray of water continuously passes also gives a small residue of crystals identifiable as diamonds.

Carbon, at atmospheric pressure, volatilizes at approximately 3600° C. without passing through the liquid state. If sufficient pressure could be applied carbon on melting would assume the liquid state and crystallize on cooling. According to Smits (2) the liquid would have a vapor pressure represented by the line BC in Fig. I, and the solid a vapor pressure denoted by line AB. The vapor pressure of the diamond would be represented by AD where D is the melting point of the diamond. Line BE shows the relation between the melting point of carbon and pressure.

Ludwig (3) has made some very interesting experiments involving the carbon arc in an atmosphere of hydrogen under 1500 to 3000 atmospheres pressure. The carbon rods were in contact and heated by the passage of the electric current. After a few seconds the current strength declined to nothing, then increased and alternated in this manner for several minutes. It is believed that the carbon points fuse to transparent carbon which is a

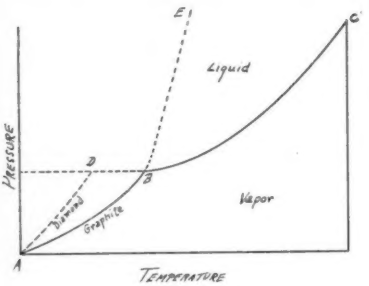


FIG. 1

non-conductor of electricity. Immediately the current ceases the points cool and the current again passes. If it were possible to obtain the fused transparent carbon in the solid form by cooling it so quickly as to allow no graphite to form diamonds would result. Experiments were made with this object in view but no form of cooling proved successful; when the fused carbon was placed in water Leidenfrost's phenomenon prevented the carbon from being suddenly cooled.

R. S. Marsden (4) in 1880 heated silver and alloys of silver and platinum in a crucible lined with sugar carbon. The molten metal dissolved a quantity of the carbon. On cooling and removing the metal by nitric acid the residue was found to consist of amorphous carbon, graphite and a small quantity of transparent crystals exhibiting the properties of the diamond. Chrustchoff (5) also obtained diamonds from a solution of carbon in molten silver. Analogous to these experiments is that of Burton (6) who obtained diamonds from a solution of carbon in molten lead-calcium alloy.

The really classical experiments in diamond synthesis are those of H. Moissan (7), the inventor of the electric arc furnace. In a series of spectacular experiments Moissan packed pure iron and sugar carbon in a carbon crucible. The crucible was heated in an electric arc (700 amps., 120 volts), until the iron melted and dissolved the carbon. When the temperature had reached 4000° C., and the iron was volatilizing in clouds, Moissan plunged the hot crucible in cold water. The sudden cooling solidified the outer layer of iron and as the inner liquid core slowly solidified an enormous pressure was produced. The iron was dissolved away and the residue remained. Black and transparent diamonds were found, together with graphite. In this manner Moissan was able to separate as many as 10 to 15 minute transparent diamonds in a single experiment. The largest diamond obtained was approximately 3/4 mm. long. It was subsequently found that the addition of a small quantity of ferrous sulphide, or silicon promoted the diamond formation.

W. Crookes (8) detected diamonds in the carbonaceous residue obtained when cordite, a high explosive, is exploded in a closed steel cylinder. The temperature was estimated as greater than 4000° C. and the pressure as greater than 8000 atmospheres.

Majorana (9) has heated amorphous carbon in an apparatus placed under a pressure of 5000 atmospheres by the explosion of gun-powder. Diamonds were produced.

A patent has been taken out in France by E. de Boismenu (10) who claims diamonds are produced by the electrolysis of molten calcium carbide. The diamonds are found about the anode and 1000 grams of calcium carbide is declared to furnish on the average, 1.75 carats of transparent diamonds.

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OREGON "JADE"

— *By* —

DR. H. C. DAKE
Portland, Oregon

For a number of years past, rolled pebbles which resemble Jade and locally termed Oregon "Jade" have been found at various localities in Oregon. This material differs from the green compact quartz plasma, which has also been called Oregon "Jade". There has been more or less speculation relative to the occurrence of Jade within the state, but the writer knows of no occurrence of true Jade in Oregon.

The rolled pebbles found are often of a fine green, in which the color is fairly evenly distributed, and when cut has a glistening vitreous lustre, taking an excellent polish. This material while resembling Jade strongly is wholly different in character.

An examination of a number of specimens of the rolled pebbles, gave the following average results:—

Color; Jade green to dark green. Hardness 6.5. Specific gravity 3.52.

Streak white. Fracture sub-conchoidal and quite rough.

Cleavange imperfect.

Optical characteristics, isotropic. Index of refraction 1.73.

Chemical composition as determined by the spectroscope, showed the material to be essentially a calcium aluminum silicate.

From the above data it will be noted the material is a typical grossularite garnet.

The diamond is in general our most valuable stone. It is the hardest of stones, has a high index of refraction and good dispersion. It is found in about all the colors of the rainbow—yellows, browns, greens, reds, blues and black and white and opalescent. It occurs in many parts of the earth but in paying quantities in only a few places.

India and Borneo furnished most of the ancient stones. Brazil was the next important source and then South Africa came to the front with probably the most phenomenal field of diamonds the world has ever known. In one twenty year period more than six and one half tons of diamonds were dug.

New South Wales and Australia furnish a few diamonds. Quite a few have been found in North America and very widely distributed; Nova Scotia, North Carolina, Georgia, Arkansas, Wisconsin, Indiana, Kentucky, Virginia, California and possibly other sections.

Only Arkansas has shown any real promise of giving a profitable yield. Over ten thousand stones have been found in that state, the largest one being about forty carats.

J. H. HOWARD.

Dr. Foshag in "Minerals from Earth and Sky", says: "Little is known of the world's largest rubies for they are jealously held by the rulers of the countries in which they have been found. Tavernier, an early traveler to India, reported one of 50 carats owned by the King of Vashapur, and valued it at six hundred thousand france.

"The German Emperor, Rudolph II, and others, are said to have possessed rubies the size of a hen's egg. A reported enormous ruby from Burma weighing 1184 carats is of doubtful authenticity, and the large gem given by Gustavus III of Sweden to Cathrine the Great proved upon recent examination to be a fine red tourmaline".

THE STAUROLITE

Jesus wept,
From His wooden cross—
Wept on that fated night;
But His tears that fell
On the rock below,
Were turned to staurolite!

WM. C. McKINLEY.

The Amateur Lapidary

Conducted by

J. H. HOWARD*

504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones.* A practical guide-book written in untechnical language for those who desire to cut and polish semi-precious stones.

FACETING

The cutting of gem stones with facets can be successfully done by the amateur lapidary. While its problems are very different from those encountered when we began cabochon cutting they are more interesting and not at all insurmountable. We do not intend to represent that the amateur without practice and merely by reading a set of instructions can cut a perfect brilliant. If that were the case there would be no pleasure in the work. Nor will we at once begin to polish sapphire and topaz. Why should we be impatient to do so? Let that come later, if we wish, but we need not be deprived of the pleasures that are afforded by this branch of the work merely because we cannot, in the beginning, do everything that can be done by the professional lapidary. We can quite readily learn to cut the stones up to 7—7½ in hardness and this class embraces a wonderful variety of gems.

The cutting of our first cabochons brought a real thrill of accomplishment. Then as our collection grew to several hundred pieces it was increasingly hard to feel enthusiastic over an ordinary "run of mine" batch of stones. Just as the narcotic user needs larger and larger doses of his drug to get a given effect so we needed finer and finer stones to bring the gratification that was at first so easily achieved. That is human nature and we need not be ashamed of it as it is the basis of all progress.

For pepping up the old enthusiasm nothing is as effective as faceting. It opens the door into a new and beautiful world. In cabochon cutting we do not create anything. We merely smooth off a job done by nature and make more readily apparent the beautiful coloring and sheen that nature has put into the stone. But in faceting we actually create a scientific instrument for interrupting and reflecting light in such a way as to form a thing of beauty. When the stone was a shapeless lump light passed thru it uninterrupted and left it cold and unattractive. But we cut faces on it at certain angles given us by the physicists and light entering its crown cannot get out the rear faces but is reflected back to our eyes, rendering the gem brilliant, sparkling and alive.

In the space available here it is impossible to give detailed instructions for doing this work but we will try to give such an idea of the method that the "beginner may begin."

The cutting of a brilliant consists of only three operations; preliminary roughing out on a carborundum wheel, one cutting with carbo grains on a cast iron lap, and one polishing with tin oxide on a tin lap. Therefore, the amateur who has been doing cabochon work has all the equipment required except the two laps and a device for holding the stones.

These items having been provided we will proceed to cut a modified brilliant of rock crystal or other stone of like hardness and index of refraction. It is best

to do some stones about 3/8" dia. before attempting anything much smaller. Shape the stone to a cylinder 3/8" dia. and 3/8" long using carborundum wheel. Grind a bevel on one end for the front facets around the table. The angle of this bevel to be 42 degrees from the plane of the girdle. Then grind a bevel from the girdle to a point in the rear. The angle of this bevel to be 43 degrees from the plane of the girdle. (There is considerable difference of opinion as to what these angles should be, but pending further discussion we suggest the above figures as given by Dr. Herbert P. Whitlock.) The stones will now have the appearance of two cones joined base to base but with the apex of one of them cut off to one half the distance from its apex to its base.

The table is now to be cut flat and polished. Do not try to do this with the lapstick at right angles to the lap. Set the stick at 10 to 20 degrees from the lap and cement the stone sidewise on the stick. While the cement is warm press the table of the stone firmly against the lap and hold it there while the cement hardens. Grind the table down flat with No. 600 carbo on the cast iron lap. Wash the work and the hands, put on the tin lap and polish with paste of tin oxide and water. Hold stone firmly against lap and keep it moving slowly across the face of the lap.

Warm the stone and remove it and set it with the newly cut table against the flat point of the lapstick. Cement in place. The stone we are going to cut will have;

8—rear main facets.
8—rear girdle facets.
8—front main facets.
8—front table facets.
8—front girdle facets.
I—table.

Proceed to cut 8 rear main facets of equal width and at an angle of 43 degrees from the plane of the girdle. Then swing the index head 6—8 degrees toward the lap, change the index head setting to intermediate position and cut 8 girdle facets. Change to tin lap and polish the 16 facets.

Remove the stone by warming. Reverse it on the stick, burying the rear of the stone in the cement and setting with the table at right angles to the lapstick. Some form of jig should be used for this setting. Cut 8 main facets at an angle of 42 degrees with the plane of the girdle and just opposite the rear main facets. Then setting the index head to intermediate position and moving it about 8 degrees away from the lap cut the 8 table facets. Then move index head about 10 degrees toward the lap from the main facet position and cut the 8 girdle facets. Now change laps and polish all front facets. Remove gem from stick, soak a short while in alcohol and wash clean.

This stone, while lacking 17 of the facets used on the conventional brilliant is full of life and sparkle. Later when we wish to cut full brilliants it may be done by using 32 "break" or "skew" facets at the girdle instead of the 16 flat facets called for in this description.

If our readers indicate sufficient interest in this subject we will go further into it in a later issue.

We amateurs would have a hard time if quartz were taken away from us. Almost everything we work with is a form of quartz. Included are; rock crystal, citrine, amethyst, smoky quartz, rose quartz, chalcedony, agate, carnelian, jasper, bloodstone, prase, chrysoprase, moonstone, tiger eye quartz and many others. It is hard enough to stand rough usage and soft enough for us to cut, and comes in such a variety that we can satisfy any taste with it.

Fine and flawless emeralds are so rare that they often exceed the diamond in value. The largest known fine emerald is an uncut stone weighing over 8 ounces and belongs to the Duke of Devonshire.

Aquamarine, essentially the same stone as emerald except in color, is quite plentiful and often of enormous size. A crystal weighing over 220 pounds and so clear it could be seen through from end to end, was found in Brazil.

Notes and News Items

from Peekskill, N. Y.

Apatite crystals of good quality, though small, and purple calcite were found in a small limestone quarry on the property of Stuyvesant Fish, Esq., near Peekskill, on August 12, 1932, by Fred W. Schmeltz, of New York City.

Anhydrite, a new mineral for this section, was found Sept. 7, 1932, at the Croft iron mine about five miles north of Peekskill by Louis Hoff, of Peekskill. The mineral occurs as a grayish-green, radiating, thin crust on microcline. Thanks are due Dr. H. P. Whitlock, Curator of Minerals at the American Museum of Natural History, New York City, for its identification.

Black tourmaline crystals in smoky quartz and clinochlore plates on smoky quartz were found at Camp Smith, near Peekskill, on October 1st and 21st, 1932, respectively, by Robert Taylor, of Peekskill.

A good specimen of crystallized selenite on graphite schist was found along the Military Road about a mile north of Camp Smith on October 11, 1932, by S. Hayes. Thanks are due Robert Taylor for reporting the discovery.

Lodestone, but of weak quality, was found at the old abandoned Canada iron mines at Fahnstock Memorial Park which borders the Seven Mile Road about ten miles north of Peekskill on October 25th, 1932, by Miss Helen Wright, of Castle Point, N. Y.

The locality was visited two days later by Charles Travis and Peter Zodac and lodestone was found outcropping near three hemlocks where the mineral forms a footwall of a long, narrow trench driven through the ore.

What is believed to be the largest deposit of titanite ever exposed in this section was seen on October 27, 1932, at the Fahnstock Memorial Park by Charles Travis and Peter Zodac who visited the district for the purpose of locating the lodestone occurrence found by Miss Helen Wright. A post hole had been dug in the parking area at the park through granite so tough it gave considerable trouble to drilling but broke with ease when blasted. The granite was heavily studded with coarse-crystalline and partly crystallized chocolate-brown titanite and at least 300 pounds of the rock was excavated. About a half-hour later the post had been set in place, excavated material thrown back and so thoroughly covered with loam that the locality was completely obliterated and no specimens can now be collected. This is an instance how interesting material is often exposed by workmen and in the most unexpected places and only the chance visit of a collector can record its occurrence and announce it to the world.

To Charles Travis, of Peekskill, is due much credit for a number of interesting discoveries made within the past few months. On September 27th, nice graphite flakes in schist forming graphite schist was found along the Military Road north of Camp Smith where it outcrops, near Hemlock Springs; Clinochlore in small plates on gabbro and rose quartz in small gemmy masses in gabbro were found October 25th at Crugers Point Park about three miles south of Peekskill; Molybdenite in small flakes in granite and opal (hyalite) in thin crusts coating granite were found in a rock cut on the Seven Mile Road about ten miles north of Peekskill on October 27th and the same day hyalite, labradorite and pyrrhotite were found at Fahnstock Park which borders the road three miles east of the cut.

The largest crystal ever recorded from Peekskill, a rough, doubly-terminated crystal of pyroxene (augite but somewhat altered), 5x4x2½ inches in size and weighing 5½ pounds, was found September 9th, 1932, at the Anthony's Nose Pyrrhotite Mine, about three miles north of Peekskill, by Peter Zodac. A nice specimen of petrified wood, brownish in color, 6x4x2 inches in size and weighing 3¾ pounds was found by the same collector at the Verplanck's Point Dolomite Quarry on August 26, 1931. The specimen is about one-half section of a limb of a tree which must have been about five inches in diameter. It was picked up from the floor of the quarry to which it had fallen from the glacial drift above. Small crystals of rutile in calcite were found the same day in the quarry. Molybdenite in minute flakes in epidote granite was found at the Croft Iron mine October 2, 1932, when the locality was visited with Ramon Conover, of Kyserike, N. Y.

In the emery district of Peekskill is a granite boulder 10x10x13 feet in size and estimated to contain 48 cubic yards and to weigh 103 tons. It rests high and dry on gabbro overlooking a small valley. This boulder is only a midget compared to those found in other sections but the question has arisen—just how large are some of the huge boulders found throughout the world? ROCKS AND MINERALS would be glad to receive notes from its readers relative to large boulders known to them with the hope of locating the largest one known. Please note that in every case the specimen must be a water-worn boulder and not a slab broken off from a cliff. To be considered, your notes must state the type of rock the boulder is composed of, its measurements, and its location. This feature will be run through a number of issues of the magazine and it is hoped readers will give it warm support and will call it to the attention of their friends too.

Club and Society Notes

MILWAUKEE GEOLOGICAL SOCIETY

The third meeting of the Society was held Wednesday, September 14th, in the Trustees Room of the Milwaukee Public Museum, at which time a newly-constructed constitution was adopted unanimously. A paper, "Mineral Collecting as a Hobby," was read by President Ben Bagrowski.

The fourth meeting was held Monday, October 3rd. The speakers of the evening were Mr. H. Kohnke who presented "Some Mineral Producing Localities," and Mr. R. N. Hafemeister, whose topic was "Rock Collecting."

Membership in the Society is open to all residing in or near the city of Milwaukee who are in any way interested in mineralogy or geology. For further particulars inquire of the President, Ben Bagrowski, 1722 S. 22nd street, Milwaukee, Wisc.

MINERALOGICAL SOCIETY OF SOUTHERN CALIFORNIA

On September 12th, the Society held the first meeting of its second year of existance at the Pasadena Library, Pasadena, Calif., with 250 members and friends being present. The speaker of the evening was Mr. J. P. Spitzel of the J. P. Spitzel Co., diamond importers of Los Angeles. Mr. Spitzel gave a highly interesting and instructive talk entitled "The Story of the Diamond." Mr. Spitzel was formerly a diamond cutter in Antwerp and a buyer of gems in the South African Diamond Fields.

Plans for the formation of a class in lapidary and for a society in Los Angeles were discussed. In December the members will contribute mineral specimens to be placed on display in the exhibit cases in the main hall of the Pasadena Library.

The Collector's Workshop

ROCKS AND MINERALS would be pleased to have its readers contribute short notes from their experiences to this department.

A HOME-MADE DICHROSCOPE

—*By*—

H. E. MAC NELLY

Textbooks on gems and minerals give very good descriptions of a dichroscope and its use, but omit a very important part—where the dichroscope may be obtained. This may seem unimportant to the writer of the textbook, but is a serious handicap to anyone wanting to investigate the action of a dichroscope.

An examination of the description and drawings of a dichroscope shows that it is a cleavage rhomb of clear calcite, with a diaphragm in front of it having a rectangular hole of a height equal to the double refraction of the calcite. A lens is placed in back of the calcite in a position to focus on the diaphragm in order to view the double image of the calcite.

The tube and lens for a dichroscope are already made to order in a standard 10 x Microscope eyepiece. A one inch rhomb of clear calcite can be obtained from a Mineral Supply House. The diaphragm is sheet copper or sheet brass from .003 inch to .01 inch thick. Copper .003 inch thick is preferable for ease of working. The tools needed are a pocket knife, scissors and a light hammer.

The calcite can be cleaved by placing the knife blade on the calcite parallel with the face of cleavage, slanting with the direction of cleavage and giving the back of the blade a sharp rap with the hammer. It is best to practice a bit on a poor piece of calcite before trying the good piece. A rhomb is split out that will fit into the eyepiece between the upper lens and the diaphragm.

Make a dot on a piece of paper and set the calcite over it as it will set in the eyepiece. Then make a second mark at such a distance that by rotating the calcite the two marks will overlap one another and show three dots instead of four. The distance between them will be the height of the hole in the diaphragm. The width of the hole should be twice the height.

Cut a circle out of the copper with the scissors of such size that it will just fit in the eyepiece and rest on the diaphragm of the eyepiece. Lay out the rectangular hole on the center of the copper disc and then cut it thru with the knife. Cut it slightly smaller than the required size and enlarge by trimming the top and bottom of the hole with the tip of the kinfe blade until the two images thru the calcite form a square without overlapping or a space between them. It may be necessary to make several diaphragms before one is satisfactory, but if carefully done, it can be made the first try.

Split a cork lengthways, cut a deep 'V' notch in each half to such size that the calcite can be placed in the cork and the cork in the eyepiece for a snug fit.

Place the prepared diaphragm in the eyepiece resting on the eyepiece diaphragm. Insert the cork and calcite part way and rotate the calcite and cork in the eyepiece until the double images coincide, then shove the calcite and cork down tight against the diaphragm to keep it from moving. Screw the eye lens in place and the dichroscope is complete. The bottom lens of the eyepiece is not taken off.

This makes a very handy pocket instrument, and also may be used as a dichroscopic eye piece for the microscope.

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MANGANESE IN WESTERN MASSACHUSETTS

—By—

MISS LOIS E. BISBEE

(A Senior in Williamsburg (Mass.) High School)

Many attempts at profitable exploitation of the metals of Western Massachusetts have been made, some successful—others dismal failures—from gold and silver, to copper, lead and zinc. One of the most interesting and most easily accessible is the manganese deposits of Plainfield.

Many traces of manganese, especially rhodonite, occur in the great fault that marks the western border of the Hawley (Mass.) schist. It is further to the south, in the town of Plainfield near the Cummington border, that the rhodonite was found in large enough quantity to work.

It was first mentioned in geological literature as far back as 1824, by H. Meade in the **American Journal of Science,** who called it "Siliceous oxide of Manganese". Several other writers mentioned its occurrence and A. Nash (**Am. Journal Sci.,** 1st Series, Vol. XII, p. 249) mentions the fact that a forge was erected with the ideas of working the black oxide for iron. It remained for Edward Hitchcock, in 1841, to approach the closest to its true composition when he called it a bisilicate of manganese.

Since 1825-1827, there have been many attempts to exploit the deposit. The most recent attempt taking place within the decade. At present there are five open pits from which the mineral has been removed, and tons of it are still on the ground awaiting removal. The main difficulties appear to be:

(1) a lack of adequate transportation facilities for the mine is located about 20 miles from the nearest railroad;

(2) the cheap importation of Russian ores; and

(3) the complexity of its chemical makeup.

The appearance of the mineral is black and dark brown on outside due to weathering into an oxide. A light-rose colored silicate in on the inside which polishes very beautifully. After it is cut and polished it will weather no more. Manganese carbonate (rhodochrosite) is present in the rhodonite and effervesces when treated with hydrochloric acid.

After it is taken from the pits, the ore is left outside in a heap to weather and then after it is completely weathered it must be worked. The nearest place is Franklin, N. J.

Rhodonite when pure is a silicate $MnSiO_3$, and has a hardness of 6.

In one of the five pits (which is approximately 25 feet deep) a very clear vein of quartz and rhodonite showed several small anticlines and synclines. Some amphibole schist nearby had garnets plainly showing. The pit with the amphibole schist had a prop in it to hold up some of the surface soil and over-hanging rock. This amphibole schist is a green rock, plentiful, and easily distinguished from the other rocks and minerals.

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An Open Letter to Our Readers

The Editor of ROCKS AND MINERALS would be pleased to receive tenders from any of his readers who would be interested in taking an active part in publishing the magazine. Our aim is to make ROCKS AND MINERALS larger and better, and, to issue it monthly at no increase in subscription price. But we need financial assistance in order to do this.

Because there is a crying need for literature on mineralogy printed in a non-technical form to be issued more often than once every three months, and feeling that among our many readers there are those who are sufficiently interested in the fascinating subject of mineralogy and who are so financially situated as to give it warm support, the editor has consented to accept tenders of assistance now, rather than to postpone improvements for some time in the future.

No commercial exploitation of ROCKS AND MINERALS would be considered. All replies will be strictly confidential. Address your communications to the Editor (Personal), ROCKS AND MINERALS, Peekskill, N. Y.

Membership Department

New Members Enrolled—July 20, 1932—October 20, 1932.

THE HONOR ROLL FOR 1932
New Members Secured Since January 1st, by:

E. H. Cienkowski, Philadelphia, Penn	15
The Gem Shop, Helena, Montana	15
Ward's Natural Science Est., Rochester, N. Y.	7
Boodle Lane, Galena, Kansas	6
John A. Renshaw, Arcadia, Calif	6
John A. Grenzig, Brooklyn, N. Y	6

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Yucca—Knowland, A. E.

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Gillham—Jourdan, W. C.

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O'Guinn, Wiley
Coalinga—Gilman, Donald F.
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We are pleased to announce that Mr. and Mrs. Nelson H. Griswold of Guilford, Conn., and two friends, were present at the Outing held at the Forest of Dean Mine June 26th. They never registered and were thus overlooked. This brings the total up to 105 who were present.

A CHRISTMAS BARGAIN

We have on hand a number of extra copies of the March 1927 issue of Rocks and Minerals and will sell them off at only 15c each (stamps accepted) as long as the supply lasts. These are good copies, of 40 pages, and sell regularly at 30c each. Rush in your orders to Rocks and Minerals, Peekskill, N. Y.

General Index of Authors and Contents

VOLUME VII --- 1932

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST, 24, 1912.

Of Rocks and Minerals published Quarterly at Peekskill, N. Y., for October 1, 1932.

STATE OF NEW YORK, } .ss.
COUNTY OF WESTCHESTER }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Peter Zodac, who, having been duly sworn according to law, deposes and say that he is the Editor and Publisher of the Rocks and Minerals and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Name of	*Post Office address*—
Publisher, Peter Zodac,	Peekskill, N. Y.
Editor, Peter Zodac,	Peekskill, N. Y.
Managing Ed., Peter Zodac,	Peekskill, N. Y.
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2. That the owners are: Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Peter Zodac, Peekskill, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC, Publisher.

Sworn to and subscribed before me this 4th day of October, 1932.

MAUD L. BARRETT,
(Seal.) Notary Public.

My commission expires March 30, 1934.

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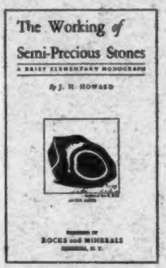

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